CLAIMS

What is claimed is:

1. A data storage device comprising:

a first wafer having a storage medium, said storage medium having data clusters, each of said data clusters having storage areas associated therewith, each of said storage areas being configurable in one of a plurality of structural states to represent information stored in said storage area;

a second wafer fixed in position relative to said first wafer, said second wafer having electron beam emitters configured to electrically communicate with said storage medium, said storage medium and said electron beam emitters being configured to move relative to each other such that at least one of said electron beam emitters is capable of providing a beam of electrons to storage areas of a first data cluster for configuring each of said storage areas of said first data cluster in one of said structural states; and

a first cluster separation area defined about said first data cluster and forming a separation between said first data cluster and adjacent ones of said data clusters such that said at least one of said electron beam emitters is prevented from writing data to one of said data clusters other than said first data cluster.

2. The data storage device of claim 1, wherein said first cluster separation area has a width associated with a manufacturing tolerance, said manufacturing tolerance being associated with fixing the position of said first wafer and said second wafer.

3. The data storage device of claim 1, wherein said first cluster separation area includes a first guard area, said first guard area being formed on a writable portion of said storage medium such that said at least one of said electron beam emitters associated with said first data cluster can write data to at least a portion of said first guard area.

4. The data storage device of claim 1, further comprising:

leads electrically communicating with said data clusters, and wherein said first cluster separation area includes a contact area, said contact area being configured to accommodate placement of said leads therein such that said leads are arranged between adjacent ones of said data clusters.

5. The data storage device of claim 2, wherein, when said first wafer and said second wafer are fixed in a position corresponding to said tolerance limit of said manufacturing tolerance, said at least one of said electron beam emitters is aligned with said first cluster separation area.

6. The data storage device of claim 4, further comprising:

contacts electrically communicating with said data clusters, said contacts being arranged in groups of contacts, each of said groups being associated with a particular one of said data clusters, each of said groups electrically communicating with one of said leads such that said contacts facilitate electrical communication between said leads and said storage areas of said data clusters.

7. The data storage device of claim 5, wherein said tolerance limit is $\pm$ 5 µm, and wherein said first guard area has a width of approximately 5 µm.

8. The data storage device of claim 6, further comprising:

a control system electrically communicating with said at least one of said electron beam emitters, said control system being configured to calibrate said at least one of said electron beam emitters such that said at least one of said electron beam emitters is configured not to attempt to write data on a portion of said storage medium occupied by at least one of said contacts.

9. A data storage device comprising:

a first wafer having a storage medium, said storage medium having data clusters, each of said data clusters having storage areas associated therewith, each of said storage areas being configurable in one of a plurality of structural states to represent information stored in said storage area;

a second wafer fixed in position relative to said first wafer, said second wafer having electron beam emitters configured to electrically communicate with said storage medium, said storage medium and said electron beam emitters being configured to move relative to each other such that at least one of said electron beam emitters is capable of providing a beam of electrons to storage areas of a first data cluster for configuring each of said storage areas in one of said structural states; and

means for preventing said at least one of said electron beam emitters from attempting to write data to one of said data clusters other than said first data cluster.

10. The data storage device of claim 9, wherein said means for preventing comprises:

means for preventing said at least one of said electron beam emitters from aligning with one of said data clusters other than said first data cluster.

11. The data storage device of claim 9, wherein said means for preventing comprises:

means for accommodating a manufacturing tolerance associated with fixing the position of said first wafer and said second wafer.

12. The data storage system of claim 9, wherein said means for preventing comprises:

means for enabling signals associated with a storage area to be propagated through an area provided between adjacent ones of said data clusters.

13. The data storage device of claim 9, further comprising:

means for propagating signals from said storage areas.

14. A method for storing data, said method comprising the steps of:

providing a data storage device having a first wafer and a second wafer, the first wafer having a storage medium, the storage medium having data clusters, each of the data clusters having storage areas associated therewith, each of the storage areas being configurable in one of a plurality of structural states to represent information stored in the storage area, the second wafer being fixed in position relative to the first wafer, the second wafer having electron beam emitters configured to electrically communicate with the storage medium, the storage medium and the electron beam emitters being configured to move relative to each other such that at least one of the electron beam emitters is capable of providing a beam of electrons to a storage area of a first data cluster of the data clusters for configuring the storage area in one of the structural states; and

preventing the at least one of the electron beam emitters associated with the first data cluster from writing data to another one of the data clusters.

15. The method of claim 14, wherein the step of preventing comprises the step of:

providing a first cluster separation area about the first data cluster, the first cluster separation area forming a separation between the first data cluster and data clusters arranged adjacent to the first data cluster.

16. The method of claim 14, wherein the step of preventing comprises the step of:

accommodating a manufacturing tolerance associated with fixing the position of the first wafer and the second wafer.

17. The method of claim 14, wherein the step of preventing comprises the steps of:

providing a contact area between the first data cluster and adjacent ones of the data clusters; and

enabling signals associated with the storage area to be propagated through the contact area

18. The method of claim 14, wherein the first data cluster has a contact associated therewith, the contact being configured to enable reading of data from a storage area of the first data cluster, and further comprising the step of:

preventing the at least one of the electron beam emitters associated with the first data cluster from attempting to write data to a location of the first data cluster associated with the contact.

19. The method of claim 16, wherein the step of accommodating a manufacturing tolerance comprises the step of:

providing a first guard area about the first data cluster, the first guard area being formed on a writable portion of the storage medium such that the at least one of the electron beam emitters associated with the first data cluster can write data to at least a portion of the first guard area.

20. The method of claim 17, further comprising the step of:

calibrating the at least one of the emitters such that the at least one of the emitters does not attempt to write data within the contact area.